AMENDMENTS TO THE CLAIMS

1. (Original) A system for monitoring cardiac function in a human patient, the system comprising:

(a) an intracorporal motion sensor positioned at the apex of the heart, which is in operable connection with

(b) a motion analysis element comprising analog-to-digital converter circuitry; central processing unit for processing signals from said motion sensor; memory for storing at least one baseline motion parameter; and an element for transmitting information to an alarm system.

2. (Original) The system according to Claim 1, further comprising:

(c) a programmer for analyzing and setting motion parameters.

3. (Original) The system according to Claim 2, further comprising one or more non-motion sensors.

4. (Original) The system according to Claim 2, further comprising a motion sensor at other than the cardiac apex.

5. (Original) The system according to Claim 1, further comprising a reference sensor.

6. (Original) The system according to Claim 1, wherein said motion sensor is implanted at said apex of the heart.

7. (Original) The system according to Claim 6, wherein said motion sensor is implanted endocardially at the right-ventricular apex, the epicardial apex, or an apical cardiac vein.

8. (Original) The system according to Claim 1, wherein said operable connection between said motion sensor and said motion analysis element comprises an electrical lead.

9. (Original) The system according to Claim 1, wherein said operable connection between said motion sensor and said motion analysis element comprises a telemetry connection.

10. (Original) The system according to Claim 9, wherein said motion analysis element is an external device.

11. (Original) The system according to Claim 1, further comprising a catheter for delivery of said system.

12. (Original) The system according to Claim 1, wherein said motion analysis element is substantially integrated with another intracorporeal device.

13. (Original) The system according to Claim 12, wherein said another intracorporeal device is an implantable pacemaker, defibrillator, cardioverter, ventricular assist device, infusion pump, implantable event monitor, annuloplasty ring, atrial-appendage occlusion device, or catheter.

14. (Original) The system according to Claim 1, further comprising an alarm capable of warning a preset threshold for a motion parameter has been exceeded.

15. (Original) The system of Claim 2, further comprising two-way wireless communication between said programmer and said motion analysis element.

16. (Original) The system of Claim 15, wherein said programmer comprises software for analysis of motion sensing data.

17. The system of Claim 1, wherein said motion sensor is an accelerometer.

18. (Original) The system of Claim 1, wherein said motion sensor is a MEMS strain gyro.

19. (Original) The system of Claim 1, wherein said motion analysis element is configured to receive data input from one or more of a magnet sensor; timing circuit; and telemetry sub-system.

20. (Original) The system of Claim 1, wherein said motion analysis element is configured to transmit data output to one or more of a pacemaker circuit; defibrillator circuit, and timing circuit.

21. (Original) A method for monitoring of cardiac function in a patient, the method comprising:

sensing the path that cardiac ventricular apex traverses over time with a motion sensor;

interpreting signals generated by said sensors; and

producing an output as a result of said interpreting.

22. (Original) The method according to Claim 21, wherein said motion sensor is an intracorporal motion sensor positioned at the apex of the heart, which is in operable connection with a motion analysis element comprising analog-to-digital converter circuitry; central processing unit for processing signals from said motion sensor; memory for storing at least one baseline motion parameter; and an element for transmitting information to an alarm system.

23. (Original) The method according to Claim 22, wherein said baseline motion parameter is determined from data collected from said patient during a timepoint determined to be normal.

24. (Original) The method according to Claim 23, wherein said interpreting step comprises:

inputting motion data into a memory slot;

calculating the axis of motion of the apex;

comparing the axis of motion to a baseline normal axis of motion;

evaluating said comparison to a preset threshold of maximum allowable deviation in the axis of motion from the baseline normal value.

25. (Original) The method according to Claim 23, wherein said sensing comprises differentially measuring motion of the apex by comparing sensing data from a measuring sensor and a reference sensor.

26. (Original) The method according to Claim 23 wherein said sensing comprises differentially measuring motion of the apex by comparing sensing data from an extended sensor where physiologic conditions vary along the length of the sensor.

27. (Original) The method according to Claim 23, wherein said motion sensor is implanted at said apex of the heart.

28. (Original) The method according to Claim 27, wherein said motion sensor is implanted endocardially at the right-ventricular apex, the epicardial apex, or an apical cardiac vein.

29. (Original) The method according to Claim 23, wherein said motion sensor and said motion analysis element are operably connected by an electrical lead.

30. (Original) The method according to Claim 23, wherein said motion sensor and said motion analysis element are operably connected by a telemetry connection.

31. (Original) The method according to Claim 23, wherein said cardiac function includes assessment of heart rate, the presence of arrhythmias, detection of pacing signal capture, and volume overload.

32. (Original) The method according to Claim 23, wherein said sensing of the path that cardiac ventricular apex traverses over time is combined with sensing from one or more non-motion sensors.

33. (Original) The method of Claim 23, wherein said sensing of the path that cardiac ventricular apex traverses over time is used to aid in the function of an integrated therapeutic device.

34. (Original) The method of Claim 23, wherein said motion analysis element is substantially integrated with another intracorporeal device.

35. (Original) The system according to Claim 34, wherein said another intracorporeal device is an implantable pacemaker, defibrillator, cardioverter, ventricular assist device, infusion pump, implantable event monitor, annuloplasty ring, atrial-appendage occlusion device, or catheter.

36. (Original) The method according to 23, wherein said sensing comprises detection of the direction of deflection of the apex.

37. (Original) The method according to Claim 36, wherein said sensing is analyzed to determine the location of a cardiac infarct.

38. (Original) The method according to Claim 23, wherein said sensing comprises detection of apex motion and twist, and is analyzed to detect acute ischemia throughout the ventricle.

39. (Original) The method according to Claim 23, wherein said producing an output as a result of said interpreting comprises producing an alarm.

40. (Original) The method according to Claim 23, wherein said producing an output as a result of said interpreting comprises delivery of a therapeutic agent.

41. (Original) The method according to Claim 23, wherein data from said patient is stored in a data repository.

42. (New) A system for monitoring cardiac function in a human patient, the system comprising:

at least one motion sensor adapted for positioning at the apex of the heart and for sensing the overall movement of the heart; and

a motion analysis element in operable communication with the at least one motion sensor, the motion analysis element adapted for receiving signals representative of the overall movement of the heart from the at least one motion sensor and for processing the received signals, wherein said signals are related to at least one predetermined baseline value of the movement of the heart.

43. (New) The system according to Claim 42, wherein the motion sensor is an accelerometer.

44. (New) The system according to Claim 43, wherein the accelerometer comprises a MEMS.

45. (New) The system according to Claim 42, wherein the motion sensor is configured to sense motion within at least one directional axis.

46. (New) The system according to Claim 45, wherein the motion sensor is configured to sense motion in only one directional axis.

47. (New) The system according to Claim 46, wherein the directional axis is the anterior-posterior direction relative to the heart.

48. (New) The system according to Claim 42, wherein the system comprises a single motion sensor.

49. (New) The system according to Claim 42, further comprising a reference sensor adapted for implantation in the heart.

50. (New) The system according to Claim 42, wherein a motion sensor is adapted for implantation at the apex of the heart and the sensed motion is apical motion.

51. (New) The system according to Claim 50, wherein the motion sensor is adapted for implantation endocardially at the right-ventricular apex, the epicardial apex, or an apical cardiac vein.

52. (New) The system according to Claim 42, wherein the at least one motion sensor is configured to interpret the processed signal as representative of an ischemic condition of the heart.

53. (New) The system according to Claim 52, wherein the ischemic condition of the heart is a location of an ischemic area, a location of an occluded coronary artery or the degree of the ischemic condition.

54. (New) The system according to Claim 42, wherein the operable connection between the motion sensor and the motion analysis element comprises an electrical lead.

55. (New) The system according to Claim 42, wherein said motion analysis element is substantially integrated with another device adapted for implantation in a patient.

56. (New) The system according to Claim 55, wherein the other implanted device is a pacemaker, a defibrillator, a cardioverter, a ventricular assist device, an infusion pump, an event monitor, an annuloplasty ring, an atrial-appendage occlusion device or a catheter.

57. (New) The system according to Claim 42, wherein the motion analysis element is further configured to transmit an alarm signal when the processed signal is determined to be outside a predetermined threshold range.

58. (New) The system according to Claim 42, wherein the motion analysis element is further configured to provide therapeutic treatment to the heart when the processed signal is determined to be outside a predetermined threshold range.

59. (New) The system according to Claim 58, wherein the therapeutic treatment comprises the delivery of pacing signals.

60. (New) The system according to Claim 58, wherein the therapeutic treatment comprises the delivery of an agent.

61. (New) The system of Claim 42, further comprising electrocardiogram means.

62. (New) A method for monitoring of cardiac function in a patient, the method comprising:

sensing the motion of the apex of the heart with at least one motion sensor implanted at the apex of the heart;

processing signals generated by the at least one motion sensor; and

producing an output as a result of said processing.

63. (New) The method according to Claim 62, wherein the output comprises an indication of an ischemic condition of the heart.

64. (New) The method according to Claim 63, wherein the ischemic condition of the heart is a location of an ischemic area, a location of an occluded coronary artery or the degree of the ischemic condition.

65. (New) The method according to Claim 62, wherein the processing comprises relating the signals to at least one predetermined baseline value of the movement of the apex of the heart.

66. (New) The method according to Claim 62, wherein the sensing comprises sensing apical motion within at least one directional axis.

67. (New) The method according to Claim 66, wherein the motion sensor is configured to sense motion in only one directional axis.

68. (New) The method according to Claim 67, wherein the directional axis is the anterior-posterior direction relative to the heart.

69. (New) The method according to Claim 62, wherein the sensing is performed with a single motion sensor.

70. (New) The method according to Claim 62, wherein the processing comprises interpreting the processed signal as representative of an ischemic condition of the heart.

71. (New) The method according to Claim 70, wherein the ischemic condition of the heart is a location of an ischemic area, a location of an occluded coronary artery or the degree of the ischemic condition.

72. (New) The method according to Claim 62, wherein the output is a cardiac pacing signal.

73. (New) The method according to Claim 62, wherein the output is the delivery a therapeutic agent to the heart.

74. (New) The method according to Claim 62, wherein the output is an alarm signal when the processed signal is determined to be outside a predetermined threshold range.

75. (New) The method according to Claim 62, further comprising performing an electrocardiogram of the heart with another sensor.

76. (New) A method according to Claim 62, wherein the at least one sensor is implanted endocardially.